

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Electromagnetic compatibility		Code 1010325331010322623
Field of study Electrical Engineering	Profile of study (general academic, practical) general academic	Year /Semester 2 / 3
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 10 Classes: - Laboratory: 10 Project/seminars: -		No. of credits 2
Status of the course in the study program (Basic, major, other) major		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 2 100% 2 100%
Responsible for subject / lecturer: dr inż. Karol Bednarek email: karol.bednarek@put.poznan.pl tel. 616652659 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Fundamentals of electrical engineering, electromagnetism, physics and mathematics.
2	Skills	Calculation of electrical circuits and electromagnetic fields distributions.
3	Social competencies	Ability to work in a team and to improving their own competence.
Assumptions and objectives of the course: Basic knowledge of electromagnetic compatibility problems and EMC simulation methods.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. student will be able to identify the sources and characteristics of electromagnetic disturbances, disturbances spreading mechanisms and their impact on the equipment and systems and identify the impact of electromagnetic fields on the technical and biological environment - [K_W05++, K_W19+] 2. student will be able to explain the causes of disorders of electrical and propose measures and equipment that limit their impact - [K_W11++]		
Skills: 1. able to analyze the causes, the effects of electromagnetic (e-m) interference, define the source and parameters of e-m disturbances, investigate mechanisms of the spread of the disorders and their effects on devices and systems, calculate the impact of e-m fields on biological technical environment. - [K_U01+, K_U02++] 2. student will be able to estimate emissions and electrical resistance to electromagnetic interference, restriction measures the effects of excess emissions and increase resistance to electromagnetic compatibility - [K_U03+, K_U18+]		
Social competencies: 1. student will gain the following skills to think and act creatively in the field of EMC, is capable of intelligible communication to the public purposes of EMC - [K_K01+, K_K02++]		
Assessment methods of study outcomes		

<p>Lectures: - assess the knowledge and skills demonstrated by the successful completion of a written problem.</p> <p>Laboratory: - test and favoring knowledge necessary for the accomplishment of problems in the area of laboratory tasks, - continuous evaluation for each course - rewarding gain skills they met the principles and methods, - assessment of knowledge and skills related to the implementation of the tasks your practice, the assessment report performed exercise, - rewarding ability to work in a team practice performing the task detailed in the laboratory, - developed aesthetic rewarding diligence reports and tasks within their own learning.</p>		
Course description		
<p>Introduction to basic problems of electromagnetic compatibility (EMC), basic and define units. Basic concepts of electromagnetism and signal analysis. Sources, classification and characteristics of electromagnetic disturbances. Coupling mechanisms of disturbances and disturbances effects on electrical and electronic systems. The influence of electromagnetic fields on biological and technical environment. Measures and devices to reduced the effects of disturbances. Fundamentals of computer simulation of EMC problems.</p> <p>Update 2017: Applied methods of education: lecture - lecture with multimedia presentation (including: drawings, photographs, animations, sound, films) supplemented with examples given on the board; Presenting a new topic preceded by a reminder of related content, known to students from other subjects; Taking into account various aspects of the presented issues, including: economic, ecological, legal, social, etc.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> Charoy A., Zakłócenia w urządzeniach elektronicznych. Zasady i porady instalacyjne, cz. 1-4, z serii: Kompatybilność elektromagnetyczna, WNT, Warszawa 1999-2000 Machczyński W.: Wprowadzenie do kompatybilności elektromagnetycznej, Wydawnictwo Politechniki Poznańskiej, Poznań 2010. Clayton R. P., Introduction to electromagnetic compatibility, Wiley - Interscience, John Wiley & Sons Inc., New Jersey, 2006 Krakowski M.:Elektrotechnika teoretyczna. Tom 2, PWN, Warszawa 1995. Alfa-Weka: Praktyczny poradnik. Certyfikat CE w zakresie kompatybilności elektromagnetycznej. Normy i zasady bezpieczeństwa w elektrotechnice. Tom 1-3, Alfa-Weka, Warszawa 1998-2001. Kurdziel R., Podstawy elektrotechniki, WNT, Warszawa 1973 		
Additional bibliography:		
<ol style="list-style-type: none"> Paul C. R.: Introduction to electromagnetic compatibility, Wiley, New York 2006. Kaiser K. L.: Electromagnetic compatibility handbook, CRC Press, Boca Raton 2005. Perez R.: Handbook of electromagnetic compatibility, Academic Press, New York 1995. Tesche F. M., Ianoz M. V., Karlson T.: EMC analysis methods and computational models, Wiley, New York 1997. Bednarek K., Elektromagnetyczne oddziaływania i bilans energetyczny w sieci zasilającej w budynku banku, Przegląd Elektrotechniczny, 90 (2014), nr 12, 188-191 Bednarek K., Kasprzyk L., Kształtowanie jakości energii i niezawodności w systemach zasilania elektrycznego, Przegląd Elektrotechniczny, 92 (2016), nr 12, 9-12 		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in class lectures	10	
2. participation in laboratory classes	10	
3. participate in the consultations on the lecture	4	
4. participate in the consultations on the lab	6	
5. preparation and development of laboratory reports	18	
6. preparation for the colloquium lecture falling under	14	
7. participation in lecture evaluation	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	64	2
Contact hours	32	1
Practical activities	34	1

